

REMARKS

Claims 1-32 are pending in this application. By this Amendment, claims 1 and 18 have been amended. No new matter has been added.

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not raise any new issue requiring further search and/or consideration since the amendments amplify issues previously discussed throughout prosecution; and (c) place the application in better form for appeal, should an appeal be necessary.

In paragraph 5, on page 7 of the Office Action, claims 5-10, 23, 24 and 26 were objected to as being dependent upon a rejected base claim but indicated as allowable if rewritten in independent form including all the features of the base claim and any intervening claims. Although Applicants appreciate this indication of the allowability of these claims, Applicants submit that claim 1, the claim from which claims 2-17 depend, and that claim 18, the claim from which claims 19-32 depend, are allowable for the reasons discussed below.

In paragraph 3, on page 2 of the Office Action, claims 1-3, 11-21, 25 and 27-32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Molinier, U.S. Patent No. 6,758,036, in view of Takahashi et al. (Takahashi), U.S. Patent No. 6,679,050. The rejection is respectfully traversed.

Applicants' invention of claim 1 calls for a device for purifying exhaust gas for an engine having an exhaust passage, the engine being operated with a lean air-fuel ratio, the device comprising a SO_x storage arranged in the exhaust passage for temporarily storing SO_x contained in an exhaust gas inflowing therein; an auxiliary catalyst arranged in the exhaust passage downstream of the SO_x storage, the auxiliary catalyst having an oxidizing ability; SO_x discharging means for discharging SO_x stored in the SO_x storage therefrom; and atmosphere control means for controlling an atmosphere of the auxiliary catalyst, wherein,

when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary catalyst being in a sulfate forming atmosphere, the atmosphere of the auxiliary catalyst is changed to an atmosphere other than the sulfate forming atmosphere, and when SO_x stored in the SO_x storage is discharged therefrom with the atmosphere of the auxiliary catalyst being in an atmosphere other than the sulfate forming atmosphere, the atmosphere of the auxiliary catalyst is maintained at an atmosphere other than the sulfate forming atmosphere, whereby the formation and discharge of sulfate from the auxiliary catalyst into the outside air is reduced. Molinier fails to disclose or suggest these features.

Applicants' invention of claim 18 calls for a device for purifying exhaust gas for an engine having an exhaust passage, the engine being operated with a lean air-fuel ratio, the device comprising a SO_x storage arranged in the exhaust passage for temporarily storing SO_x contained in an exhaust gas inflowing therein; an auxiliary catalyst arranged in the exhaust passage downstream of the SO_x storage, the auxiliary catalyst having an oxidizing ability; and SO_x discharging means for discharging SO_x stored in the SO_x storage therefrom, wherein discharge of SO_x stored in the SO_x storage therefrom is prevented or suppressed when the auxiliary catalyst is in, or is turned to, a sulfate forming atmosphere, whereby the formation and discharge of sulfate from the auxiliary catalyst into the outside air is reduced. Molinier fails to disclose or suggest these features.

In Molinier, the sulfate forming atmosphere is an atmosphere in which H_2S or SO_x is released from the sulfur trap (col. 4, lines 54-55). As Molinier describes, H_2S or SO_x is far more detrimental to a NO_x absorber in a lean environment than in a rich environment (col. 5, lines 5-6). Molinier further states that "in spite of all efforts to prevent sulfur from being captured on NO_x absorbing sites, NO_x absorber desulfurization will be necessary after a period of time unless a bypass system combining valve 6 and pipe 7 is provided" (col. 6, lines 10-14). Accordingly, Molinier is trying to prevent sulfur poisoning of the NO_x absorber by

introducing fuel to the NO_x absorber prior to a sulfur trap and/or particulate trap regeneration stream entering the NO_x absorber (col. 5, lines 49-60). In other words, Molinier only describes a method for regenerating a sulfur trap in an exhaust system having a sulfur trap disposed upstream of the NO_x absorber in order to prevent or suppress the H₂S or SO₂ from being trapped in the NO_x absorber. The sulfate that is trapped in Molinier's NO_x absorber would not be discharged to the outside air as long as it remains trapped. Nowhere does Molinier disclose or suggest a way to suppress or prevent sulfate SO₃ from being formed and discharged from the auxiliary catalyst into the outside air.

The Applicants' device, on the other hand, is directed to controlling the sulfate forming atmosphere in which sulfate SO₃ is formed and discharged into the outside air. As describe by the Applicants, when the auxiliary catalyst is in an atmosphere in which the amount of the reducing agent is smaller than the allowable lower limit amount and the temperature of the auxiliary catalyst is higher than the allowable upper limit temperature, a large amount of sulfate may be discharged from the auxiliary catalyst (page 23, lines 7-14). In other words, a large amount of SO₃ may be discharged from the auxiliary catalyst into the outside air if SO_x flows into the auxiliary catalyst, which is in the sulfate forming atmosphere. The sulfate forming atmosphere is an atmosphere in which the amount of sulfate discharging from the auxiliary catalyst is increased. Applicants' invention addresses this problem. Molinier's invention does not.

Further, as the Office Action admits on page 4 that "Molinier fails to disclose that in a sulphate forming atmosphere, a temperature of the auxiliary catalyst is higher than allowable maximum temperature." The Office Action further admits on page 9 that "there is no modification whatsoever of the device and the method of operating the device in Molinier by the combination of two references." The Office Action states, "the reference of Takahashi et al. is only utilized to show an obvious fact that a sulfate forming atmosphere for a catalyst

adsorber (9) is well defined and understood. As indicated on lines 17-36 of column 5, the catalyst adsorber (9) only adsorbs SO_x during a lean air-fuel ratio environment and adsorbs more SO_x when a temperature of the catalyst is higher than a predetermined temperature.”

But Takahashi also states the SO_x trapping rate becomes smaller if the temperature rises above the predetermined temperature (col. 5, lines 29-31). It is unclear where the Office Action gets its assertion from reading lines 17-36 of col. 5. In the lean atmosphere, the NO_x absorber (5) in Molinier and the rear three-way catalyst (9) in Takahashi, which more correspond to Applicants' auxiliary catalyst, trap SO_x therein, resulting in sulfate SO₃ not being discharged from the absorber (5) and/or catalyst (9). Further, even when the temperature of the absorber (5)/catalyst (9) becomes higher and the SO_x trapping rate becomes smaller, an amount of sulfate discharged from the absorber (5)/catalyst (9) does not increase, but an amount of SO₃ (H₂S, SO₂) passing through the absorber (5)/catalyst (9) will increase. The fact that something is a mere possibility or can be modified does not satisfy the requirements of 35 U.S.C. §103. As MPEP §2143.01 states, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." *In re Mills*, 916 F.2d 680, (Fed. Cir. 1990). This is especially true given Takahashi and Molinier fail to describe or suggest a device for suppressing and/or preventing SO₃ from being formed and discharged from the auxiliary catalyst into the air. Thus, Takahashi lacks the required suggestion under 35 U.S.C. §103 to modify Molinier to achieve the desired features recited in claims 1 and 18.

Accordingly, as neither of the applied references teach, disclose or suggest all the features recited in claim 1, they cannot teach or suggest claims 2, 3 and 11-17 for that reason and for the additional features recited. Similarly, as neither of the applied references teach, disclose or suggest all the features recited in claim 18, they cannot teach or suggest

claims 19-21, 25 and 27-32 for that reason and for the additional features recited. It is respectfully requested that the rejection be withdrawn.

In paragraph 4, on page 6 of the Office Action, claims 4 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Molinier in view of Takahashi, and in view of Hirota et al. (Hirota), U.S. Patent No. 5,974,791. The rejection is respectfully traversed.

Takahashi and Hirota fail to overcome the deficiencies of Molinier as applied to claim 1 and, similarly, as applied to claim 18.

Accordingly, as the combination of applied references does not teach, disclose or suggest all of the features recited in claim 1, it cannot suggest claim 4 for that reason and for additional features recited. Similarly, as the combination of applied references does not teach, disclose or suggest all of the features recited in claim 18, it cannot suggest claim 22 for that reason and for additional features recited. It is respectfully requested that the rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-32 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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